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M. C. Rogers







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# PHILOSOPHICAL TRANSACTIONS.

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For the Month of November, 1699.

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I. *An Account of two Glands and their Excretory Ducts lately discover'd in Human Bodies. By Mr. William Cowper. F. R. S.*

Notwithstanding the general application of the Learned in this Age to Anatomy, and the success wherewith they have cultivated it, there remain undoubtedly many considerable Discoveries to be made, many useful Organs to be detected, of great consequence to the right understanding of the **Animal Oeconomy**; for the knowledge of which perhaps Posterity shall be obliged to the successful Labours of those that shall come after us, and wonder how they escap'd our Observation, as we have done by those that preceded us. Of this the Discovery of two Glands (not before that we know taken notice of in a Humane Subject) may be an Instance, especially since they are found in a part that has not only been accurately described by others, but frequently and carefully examin'd by my self before I took notice of them. This may encourage us not to despond, if we don't find all our Enquiries attended with Discoveries, nor to set an over-value upon our selves for those which our good Fortune may present us with; since it is sometimes the misfortune of Men of greater Application and Sagacity than our selves to meet with Disappointments.

About a quarter of an Inch below the Prostate Glands (Fig. 1. E.) I found two other small Glands (*ib.* G G) placed on each side the *Urethra* (*ib.* F) a little above the  
the



the Bulb of its Cavernous Body : (*ib.* 1.) These Glands are of a deprest Oval Figure, not exceeding the magnitude of a small *French Bean*. After those parts of the *Musculus Accelerator* (*ib.* 11) are removed, which pass over these Glands, you may feel them placed like two hard Bodies on each side the *Urethra*. They incline to a yellowish colour like that of the Prostates. Their Excretory Ducts appear on their internal Surface (Fig. 2. A. b) next the inner Membrane of the *Urethra* (Fig. 2. C) whence they descend about half an Inch in length before they grow less and pierce that Membrane obliquely at their opening into the *Urethra*, (*ib.* D.) in which they discharge their separated Liquor. After opening the upper part of the *Urethra* towards the *Dorsum Penis* and expanding its inner Membrane, if you compress these Glands, you may see their Liquor issue from two distinct Orifices, which is very Transparent and Tenacious: these two Orifices open into the *Urethra* just below its bending under the *Ossa Pubis* in the *Perineum*.

The Artifice of Nature is very extraordinary in thus placing these Glands and their Excretory Ducts, since on the Erection of the *Penis* and the distension of the Bulb of the Cavernous Body of the *Urethra*, they are thereby necessarily compressed, and the Liquor contain'd in their Excretory Ducts forced through their two Orifices into the Cavity of the *Urethra*: besides this, that part of the *Musculus Accelerator* (mention'd above) which passes over these Glands, contributes to this Compression. It seems requisite such Agents should Conspire in Compressing these Organs, since the Liquor they separate is so very Tenacious; which consistence of it is absolutely necessary for the Uses it is employed in.

The



The main design of Nature in framing these Glands seems to respect the grand Work of Generation, which will be more evident if we examin the Analogous Organs in other Animals. In Rats these Glands are remarkably large, and are so placed that upon the Erection of the *Penis* they are compressed by its Turgescency and apposition of the *Ossa Pubis*; the like may be observ'd in other Animals, particularly in Hedg-hogs.

Boars have these Glands very large, and the Matter they separate is more tenacious, and not so transparent as in all other Creatures I have examin'd; there is something peculiar in the contrivance of them in this Animal, each Gland being cover'd with a peculiar Muscle not unlike the Gizzards of some Fowl; which Mechanism seems contrived for more forcibly compressing of them, to discharge their very tenacious Contents into the *Urethra*, and that not only in the time of Coition, but at any other time; which seems to be more peculiarly required in those Creatures, because the passage of their Urin is very long, and therefore stands in need of more of this Glutinous Matter to besmear it, whereby it is defended from the injuries that may arise from the Salts of the Urin. As the Urin of different Animals is more or less impregnated with pungent Salts, so the proportion of these Glands differ as well as on the account of the various lengths of their *Urethra's*. It is remarkable we don't find these Glands in Females like those in Males, tho' they have something Analogous to them, which are described in Women by *De Graaf*, and call'd *Prostata Mulierum*; but the Orifices of their Excretory Ducts opening at the exit of the *Urethra*, they serve to defend the *Nympha* and *Labia Pudendi* only from the Urinous Salts, and discharge their Liquor in Coitu, as I have elsewhere taken notice; the whole *Urethra* in them being so short, that the contra-

ction



ction of the Sphincter Muscle of the Bladder is sufficient to expel any remains of Urine from that passage.

The Use of the Glands (I have now Described) is twofold; first on the Erection of the *Penis* there is so much of their Liquor discharged into the *Urethra* as suffices to drive out any remains of Urine, and prevent its mixing with the *Semen*; and at other times the continual discharge of some part of their Liquor into the *Urethra*, defends that passage from the Salts in the Urine: the like continual exsudation cannot happen either from the excretory Ducts of the Prostates or those of the *Vesiculae Seminales*, because the nearness of the Sphincter Muscle so corrugates the inner Membrane of the *Urethra*, as prevents an easie passage of the Liquor by the *Ostiole* of the former: nor can the *Semen* run out of the latter, since the *Caruncula* or *Caput Gallinaginis* is contriv'd on purpose to prevent it: wherefore the *Diaphragme*, Abdominal Muscles, and *Levatores Ani* are employed in compressing those parts to discharge their Contents.

It is not improbable that the Matter which flows at the latter end of the Cure of Venereal Diseases, and is called a *Gleet*, proceeds from these Glands, and not from the *Prostata* or *Vesiculae Seminales*, as is commonly supposed; which may afford us no mean Argument for the Use of Injections in such Cases; instead of which some Practitioners persecute their Patients with violent Purges, and cram them with vast quantities of Astringent Medicines. We may easily conceive how such Gleet becomes sometimes very Obstinate, if not Incurable, by supposing the Ulcer in that Contact to happen upon the *Ostiole* of these Secretory Ducts.



## F I G. I.

- A, A Portion of the Bladder of Urine.  
 BB, Parts of the Ureters.  
 CC, Parts of the *Vasa Deferentia*.  
 DD, The *Vesicula Seminales* somewhat distended with  
 Wind by blowing into the *Vasa Deferentia*.  
 aa, The Blood Vessels of the *Vesicula Seminales*.  
 E, The *Glandula Prostatæ*.  
 F, The *Urethra* expanded after opening its superior  
 and fore part to see the *Ostiolæ* of the Excre-  
 tory Ducts of the following Glands.  
 GG, The two Glands above described, which from the  
 Liquor they seporate may be call'd *Glandula*  
*Mucosa*.  
 h, The Excretory Duct of one of the last mention'd  
 Glands, before it passes under the Bulb of the  
 Cavernous Body of the *Urethra*.  
 I, The Bulb of the Cavernous Body of the *Urethra*  
 partly distended with Wind, and devested of  
 the Accelerator Muscle to shew its External  
 Membrane, which is very thin, whereby the  
 last nam'd Muscle does more adequately com-  
 press that Bulb, and drive its contain'd Blood  
 towards the *Glands* when the *Penis* is Erected.  
 K, The third Pair of Muscles of the *Penis*.  
 LL, The Accelerator Muscle divided in its middle  
 Seam on the Bulb, and afterwards freed from  
 it, and Expanded.  
 ll, The upper part of this Muscle which passes imme-  
 diatly over the Mucous Glands.  
 MM, The *Musculi Directores Penis*.  
 NN, The Cavernous Bodies of the *Penis*.  
 O, The Cavernous Body of the *Urethra*.  
 P, The



P. The Ligature made to prevent the Wind from passing out of the Cavernous Body of the Urethra and its Bulb.

Q. The Aperture by which the Inflation was made.

F I G. II.

One of the Mucous Glands after being Macerated in Water, and its Excretory Duct fill'd with Quicksilver.

A. The Mucous Gland somewhat distended;

b. Its Excretory Duct.

C. A Portion of the Internal Membrane of the Urethra Expanded.

D. The Ostiola of the last mention'd Excretory Duct.

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II. *Epistola D. Raymundi Vieussens, M.D. & S.R.S.  
ad Societatem Regiam Londinensem missa, de Or-  
gano auditus.*

*Viri Clarissimi,*

CUM nihil mihi jucundius atque gloriosius esse pos-  
sit quam vobiscum colloqui, ne miremini quæso  
quod vos supplex rogare ausim, ut meam hanc Episto-  
lam de meis circa organum auditus animadversionibus  
benevolo, gratoque animo accipiatis, & vestrum, cum  
libuerit, de illa judicium ad me mittatis, quod deinceps  
eam typis excudendam tradam, si vobis Digna videat-  
ur, quæ aliquando publici juris fiat. Clarissimus,  
D. Duverney vir non modò anatomicarum, sed & phy-  
sicarum, medicarumque rerum peritissimus de hac cor-  
poris nostri parte de qua hic dicturus sum, eximiè sanè  
scripsit; verum ut ut accuratè illam descripserit, ad-  
vertetis tamen, ni fallor, viri spectatissimi, me nova  
quædam in structura interiori ejus derexisse, quæ vo-  
bis forsan, ut & mihi, per necessaria videbuntur ad fa-  
ciliorem explicati onem auditus, imò & morborum,  
quibus hæc ipsamet pars obnoxia est; quapropter hæc  
breviter & nitidè, quantum fieri poterit, hîc vobis ex-  
ponam, & postmodum nervos septimæ conjugationis  
describam.

Imprimis, Animadverti membranam tenuissimæ, ra-  
ræque admodum texturæ intra cavitatem tympani esse:  
hanc, habita ratione loci quem occupat, interiorem  
membranam tympani nuncupo, ut ab ea distinguatur,  
quæ meatus auditorii finem extremum obturat, & quam  
exteriolem ipsiusmet tympani membranam nominare  
placet,



placet, quò scilicet idea unius nunquam cum idea alterius confundi queat, hæcce membrana peritis omnibus anatomicis nota, & à nullo, quod sciam, rectè descripta, si attentè perspiciatur, in utraque aure vasis capillariibus penè infinitis apparet irrigata, quæ carotis arteria, & vena jugularis utriusque lateris ipsi largiuntur. Hinc fit, ut vasculis, quibus irrigatur, sanguine supra modum turgentibus tota ferè rubra videatur, cum radiorum solarium interventu, ac præsertim microscopio intermedio exploratur. Ejusmodi vascula impediunt nè membranæ, qua suffulciuntur, partes, superna scilicet & laterales, in semetipsas corruant, & complicantur, uti proculdubio corruerent & complicarentur, nisi eas suspensas tenerent ; quoniam per se ipsas interiori superficiei hujus, qua continentur, cavitatis immediatè non adhærent.

Hæc ipsamet membrana, quæ est productio membranæ tenuis interiora aquæductus investientis, os speciei cujusdam specus occludit, quæ itur ad foveolas intra mastoidem apophysin excavatas ; proindeque impedit nè conclusus in iis aër, liberè saltem, cum aëre tympanum subeunte communicet ; ac præterea tenuissima ejus productio una stapedis aperturam, altera verò foramen vulgò rotundum nominatum obturat, & ulterius extensa toti supersternitur interiori superficiei exigui hujus spatii cavi, quod à foramine rotundo extenditur ad extremum usque finem ductus semi-ovalis spiralis cochleæ, & usque ad rimulam incisam basi conchæ. Ita ut interior tympani membrana hac productione sua intermedia, qua scilicet extremitatem ductus semi-ovalis spiralis cochleæ, & rimulam basi conchæ insculptam extrinsecus occludit, communicet cum hac portione membranæ nerveæ interioribus conchæ parietibus superstratæ, quæ baseos conchæ ejusdem rimulam intus claudit, & cum extremitate laminæ nerveæ spiralis,

quæ



quæ intra ductum semi-ovalem spiralem cochleæ reconditur.

Præterea membrana, de qua nunc agitur, subrus illam sui partem, qua externam tympani membranam respicit, sat amplum relinquit spatium vacuum, quod aquæductu ad se delatum aërem extrinsecum admittit: interea hæc in semetipsam ita convolvitur, & complicatur, ut intra eam tres formentur cavitates. Prima huiusmodi cavitatum occupat spatium, quod externæ incudis apophysi, & huic interjicitur specui, quæ itur ad foveolas apophyseos mastoidis, ut supra dixi: secunda primæ & tertiæ intermedia, iisque minor præcisè basi conchæ substernitur, & malleoli caput, necnon fermè totum incudis corpus intra se recondit: tertia omnium amplissima internum aquæductus orificium respicit, & intra se continet ventris primi auris internæ musculi & incudis portionem unà cum binis illius apophysibus, stapedem, os Lenticulare, tendinem secundi auris internæ musculi, & cervicem unà cum manubrio malleoli.

Demum membrana, de qua nunc loquor, in quibusdam tantum hominibus ita conformatur, ut parva illius portio in membranulam tenuissimam abeat, qua dimidium circiter spatium tertiæ necnon maximæ cavitatum ejus comprehensum in duas partes velut septo intermedio dividitur. Ejusmodi membranula à nullo anatomico, quod sciam, hætenus descripta, & à me viris Clarissimis, D.D. Barbeyrac, Joly, Marcot, Verny Doctoribus medicis peritissimis, & quam pluribus aliis medicis, & medicinæ studiosis in musæo meo ostensa in omnibus ferè hominibus desideratur, & in iis, in quibus reperitur, superna sua parte basi conchæ, & inferna exteriori tympani membranæ meatus auditorii finem extremum occupanti, & obturanti alligatur, eamque in binas partes fermè æquales ex transverso secare videtur



videtur ad extremum usque finem manubrii malleoli, cui adhærescit, imò & paulo ultra. Ita ut membranula ista unà cum extremo fine manubrii malleoli mediam partem exterioris membranæ tympani versus interiora cavitatis ejus attrahat, eamque ita inclinet, ut è regione meatus auditorii parum concava, & è regione cavitatis tympani parum convexa sit. Hæc membranula apta nata est, quæ in hominibus in quibus non desideratur, impediatur nè validioribus muscoli monogastrici auris internæ contractionibus exterior tympani membrana supra modum distendatur, vel extremitate manubrii malleoli dilaceretur, cum prædictus musculus convulsione, vel motu convulsivo afficitur. Ita ut hæc membranula vices quodammodò supplere videatur muscoli antagonistæ muscoli monogastrici, de quo nunc dixi, si spectetur quatenus tendine suo gracili & longo agens, ut ex dicendis in sequentibus patebit.

Siquis horum omnium perspiciendorum jucunda curiositate frui velit, os petrosum secernat à reliqua calvaria hominis strangulati, vel phrenitide, aut apoplexiâ perempti, si fieri possit: os illud à reliqua calvaria secretum per biduum in loco sicco servandum, ut per id tempus membrana, quam nunc describo, parum exsiccet, adeoque in semetipsam contrahatur, ut, quantum par est, secedat ab interna superficie cavitatis, intra quam continetur, nè ab anatomico illius texturam penitus exploraturo dilaceretur. Postea os sat tenue, quod supernam tympani partem constituit, frustulatim cultro peritè secandum, & auferendum est. Et verò cum primum superna tympani pars secta & ablata fuit; membrana, de qua nunc, intra cavitatem illius antea latens oculis subjicitur, & adeò numerosis vasis capillaribus irrigatam sese prodit, ut hæc, cum singula ejus vasa repleta sunt sanguine, speciem quamdam retis mirabilis repræsentet.

Mem-



Membrana jamjam descripta mirabilibus sanè munis præstandis, & mox designandis dicata est. Imprimis hæc quâ tenui productione sua occludens labyrinthi januam impedit, nè naturalis purissimus ac subtilissimus aër intra diversas cavitates, diversosque illius mæandros latens communicationem, saltem valde liberam, habeat cum aëre crasso, qui tympani cavitatem aquæductu subit.

Secundò hæcce membrana miti calore sanguinis vasorum, quibus adornatur, ossæam, labyrinthi totius basin leniter calefacit, & uno eodemque tempore fovet atque conservat motum aëris in binis vestibulis, flexuosisque omnibus illius ductibus conclusi, & Lymphæ defæcatissimæ animali spiritu imprægnatæ, qua singulæ nervi mollioris auris propagines inferiùs describendæ imbuuntur.

Tertiò eadem membrana intra cavitates suas aërem benigno calore sanguinis vasorum suorum maximè rarefactum continet, qui utpotè maximè rarefactus, atque adeò tenuissimus, & magnâ æthereæ materiæ copiâ imprægnatus valde aptus est, qui corporum omnium sonorum impressiones faciliè recipiat, easque citissime ad aërem, & singulas propagines nervi mollioris auris interiora labyrinthi adornantes, necnon ad ovale cerebri centrum transmittat.

Ex iis, quæ modò diximus, planè sequitur membranam, de qua nunc agitur, auditui producendo mirum in modum conducere: ita sane hæc ut potè valde tenuem, raramque texturam habens liberum in cavitates suas introitum, pariterque liberum ex iis egressum præbet sonorum objectorum impressionibus, quæ cum primùm aëri caput ambienti communicatæ fuerunt, æthereæ, qua gravidus est aër, materiæ motu, & membranæ exterioris tympani innumeris foraminibus insensibilibus perviæ, necnon aquæductus interjectu ad ipsam



sam transmittuntur. Ac re quidem ipsa quævis, nisi mea me fallit opinio, objectorum sonorum impressiones aëris intra cavitates membranæ supra descriptæ contenti, aut ipsam extrinsecus ambientis quæ scilicet æthereâ gravidæ materiæ interventu momento citius interiora labyrinthi per portam & fenestram illius subeunt, & ex eodem labyrintho interjectu spiritus animalis, cui inibi communicantur, etiam momento citius ad ovale usque cerebri centrum transmittuntur; ibique loci pro diversis sonorum objectorum impressionibus diversæ excitantur in anima idææ, diversas soni species designantes, quæ diversis nominibus exprimi solent. Eorum, quæ modò diximus, veritas experientiâ confirmatur; quoties enim pus abscessus intra mastoideam apophysin, vel intra tympanum ipsum producti hanc, de qua nunc, membranam dilacerat, prorsusque rodit, toties auditus ita læditur, ut multum imminuatur, si non prorsus aboleatur, ut in observationibus meis anatomico-practicis explicabitur.

Ex supra dictis clarè intelligitur, Viri Clarissimi, intra tympanum necessario excitandum esse tumultuosum quemdam motum præternaturalem sonum producentem, quoties immodico cibi, potusque usu, vel obstructionibus imi ventris, vel longis, plurimumque laboriosis animi contentionibus, vel aliâ quapiam causâ nimia sanguinis supra modum rarefacti, & vaporosi quantitas ad vascula superius descriptæ membranæ amandatur. Is enim sanguis nimia copiâ nimiaque rarefactione sua eas, quibus devehitur, arteriolas magis, quàm par est dilatat necnon pulsât, & tum nimia huiusmodi vasorum dilatatione atque pulsatione, tum nimio halituum copiosiorum, quas emittit, motu hanc membranam ita concutit, ut tumultuosus aliquis strepitus intra tympani cavum necessario excitetur; præsertim si vapores illi propter aquæductus obstructionem,



nem, vel propter nimis compactam texturam exterioris membranæ tympani facile transpirare nequeant. Tumultuosi autem hujusmodi strepitus impressio ad ovale usque cerebri centrum translata hanc in anima excitat ideam, quæ murmuris auris nomine vulgò exprimi solet. Hujusce murmuris tres sunt species omnibus notæ, & à nemine, quod sciam, planè ac distinctè explicatæ; bombus scilicet, sibilus, & tinnitus.

Quoties vapor supra modum copiosus, & exagitatus, qui murmur aliquod in auribus excitat, ita humidus est, ut ad naturam aquæ sat propè accedat, interiorē, facileque mobilem membranā tympani relaxat, & uno eodemque tempore ipsam movet varièque flectit, Hinc fit, ut hæcce membrana nonnihil relaxata, motuque sibi communicato variè ac velut undatim flexa cū ambientem, tum intra cavitates suas reconditum aërem ita exagitet, ut vibrationes debiles lentè necnon flexuosè, ac velut undatim sese invicem excipientes patiatur, quales ferè patitur, dum vel ab aqua è loco sublimi delabente, & cumprimū delapsa est, undatim defluente, vel quamplurimis ab apibus simul congregatis, & partim sursum, partim deorsum, partim obliquè, partimque in orbem motis agitur. Istæ autem vibrationes spiritus animalis nervi mollioris auris textum interioris occupantis interjectu ad ovale usque cerebri centrum delatæ hanc excitant in anima ideam, quæ sonum tumultuosum gravem bombi nomine vulgò expressum designat.

Ubi vapor murmuris cujusdam in auribus excitandi capax particularum aquosarum tam inops est, ut potius exhalationis siccæ, quàm meri vaporis naturam redeat, atque adeò flatulentus sit; is membranā interiorē tympani, dum huic alliditur, quadantenus exsiccat, illam expandit, atque distendit. Inde fit, ut hæcce membrana communicato sibi motu nonnihil exsiccata, & expansa, adeoque plurimū distenta tum ambien-



ambientem, tum intra cavitates suas latentem aërem ita concutiat, ut in eo vibrationes validas excitet, quæ successivè sanè, sed tamen cito, & rectis vel fermè rectis lineis sese invicem consequuntur. Ita ut ejusmodi vibrationes his ferè similes sint, quas patitur, quoties mero flatu supra modum exagitatur; proptereaque illæ ad ovale usque cerebri centrum eâ, quâ supra explicatum fuit, ratione transmissæ hanc excitant in anima ideam, quæ sonum tumultuosum sat acutum sibili nomine vulgò expressum designat.

Quoties interior membrana tympani, aut aliqua pars illius ab arteriis ipsam irrigantibus solito frequentius, validiusque succussibus sese velocissimè excipientibus ob sanguinis fluxum tunc in his aliquatenus impeditum quatitur, toties illa (si tunc temporis præcalido & exsiccante quodam halitu ita distendatur, ut immixtos sibi succussus validè repercutiat) tum ambientem, tum intra cavitates suas reconditum aërem ita exagitat, ut easdem aut ferè easdem patiatur vibrationes, quas pateretur, si vibrationes illius argenteo malleolo excitarentur; quo scilicet parvis ictibus iteratissimè sese excipientibus incus parva percuteretur, quæ ex argento, vel alio quodam metallo valde sonoro, proindeque ad incussas sibi ictus validè repercutiendos apto conflata esset. Unde mirum non est, quòd ejusmodi vibrationes, cum ad ovale usque cerebri centrum pervenere, hanc excitent in anima ideam; quæ sonum præternaturalem tinnitus auris nomine vulgò expressum denotat.

Dissensus Anatomicorum tum veterum, tum recentiorum de numero, & usu muscutorum auris internæ veri eorum numeri, verique usus inquirendi mihi ansam præbuit, Viri spectatissimi; eos igitur multis abhinc annis sæpissimè indagavi, & partem hanc duobus tantum instructam esse semper observavi: hi nervulos



penè insensibiles à nervis quintæ conjugationis recipiunt, & vasculis sanguiferis etiam penè insensibilibus irrigantur, quæ sunt arteriæ carotidis, & venæ jugularis internæ propagines; illorum primus crassior & longior unicum ventrem, bina capita, binosque tendines habet; unde proculdubio factum est, ut Anatomici quamplurimi, qui oculatissimi habentur, eum duos musculos ab invicem distinctos esse putaverint. Verùm cum musculus iste unicum habeat ventrem, illum musculum unicum esse asserere ausim, quem, utpotè unico ventre instructum, musculum monogastricum nominare lubet.

Primum musculi monogastrici auris internæ caput vaginulâ membranaceâ vestitum è sinu exiguo osseo supra partem supernam aquæductus excavato emergit; secundum verò, quod merè carnosum apparet, non procul à latere externo exigui sinus ossei, de quo mox dictum, suam ducit originem. Fibræ carneæ bina diversa capita musculi, de quo nunc agitur, componentes invicem strictissimè uniuntur paulo antequam tympani cavitatem subeant, & tunc in ventrem vaginâ membranaceâ sat validâ undequaque cinctum unius & ejusdem musculi desinunt. Deinceps ipsæmet fibræ carneæ, de quibus jam loquor, versus tympani cavum sese porrigentes, paulo postquam illud subierunt, ab invicem separantur, & in binos tendines vaginulâ membranaceâ validâ indutos abeunt; horum primus secundo longior necnon gracilior, postquam sese parum sursum erexit, parvæ trochleæ membranosæ interventu huic ossis petrosi parti alligatur, cui insculptum est initium aquæductus Fallopii, seu canaliculi ossei, qui nervum durum auris admittit; ita ut officioso hujusce membranosæ trochleæ ministerio liberè motus omnes edat, quibus edendis dicatus est: tendo iste deorsum reclinatus super gracilem malleoli apophysin ad perpendiculum descendit, eique  
 annecti-



annectitur sese parum expandendo ; unde fit, ut ejus nexus ad cervicem usque ipsiusmet malleoli extendatur.

Secundus musculi, quem jam describo, tendo primo brevior & crassior, multumque crassâ vaginâ membranaceâ vestitus in cavitatem tympani rectâ fere porrigitur, & mediæ capitis malleoli parti annectitur, ibique ita explicatur, ut ejus nexus ad corpus usque incudis protendatur, adeoque binis ejusmodi ossibus invicem nectendis interserviat : tendo iste ossi, cui supersternitur membranaceæ vaginæ suæ interventu alligatur.

Secundus auris internæ musculus ab Anatomicis quamplurimis recte descriptus emergit è tubulo osseo excavato in parte infima ossis, quod portæ labyrinthi, & illius fenestræ interjicitur. Musculus iste musculo monogastrico supra descripto multo minor & brevior est. Hinc fit, ut illum musculum minorem auris internæ nominem. Ventrem carnosum fat crassum habet, & tendine suo maxime gracili capiti stapedis inseritur.

Dum musculus monogastricus auris in semetipsum contrahitur, longior illius tendo caput malleoli & corpus incudis parum sursum tollit. Dixi tendinem longiorem musculi monogastrici auris caput malleoli una cum incude parum solummodo sursum tollere ; quoniam tendo brevior ejusdem musculi, utpote capiti malleoli extremo suo fine annexus, quemadmodum longior illius apophysi gracili, atque cervici annectitur, longiori renititur, dum sese contrahit ; quia vaginâ suâ ossi alligatur, cui superjacet, ut supra notatum, & propter ejusmodi nexum versus superiora multum tolli nequit ; unde fit, ut tendinis longioris sese contrahentis nisui quodammodo resistat, & impediat nè caput malleoli una cum incude versus superiora multum tollat, ut supra mox notavi.

Ubi malleoli caput sursum tollitur, extremitas manubrii ejus necessario deorsum inclinatur, adeoque partem



rem mediam, cui adhærescit, exterioris membranæ tympani ex interioribus ejusdem tympani versus exteriora pellit, atque adeo illam tendit, ejusque superficiem planam, aut saltem ferè planam reddit,

Dum tendo muscoli monogastrici auris, de quo nunc, & malleolus hæc, quæ modò dixi, munia præstant, hanc extendunt membranulam supra descriptam, quæ membranam exteriorem tympani ex transverso secare videtur, cum non desideratur. Ita ut ejusmodi membranula muscoli antagonistæ muscoli monogastrici auris vices quodammodò supplere videatur; quoniam vi sua elastica naturalem tensionis suæ statum recuperat, & eodem, quem tunc edit, nisu exteriori membranæ tympani ad statum naturalem tensionis, & figuræ suæ restituendæ conducit, cum hæc extremo fine manubrii malleoli premi cessat.

Quemadmodum elatione capitis malleoli versus superiora extremitas manubrii ejus paràm deorsum inclinatur; sic etiam elatione incudis versus superiora extremitas internæ apophyseos illius paululum demittitur. Dixi modò elatione incudis extremitatem internæ apophyseos illius paululum solummodò demitti; quoniam incus ita sita est in fovea ossi marginem anteriorem basios cavitatis tympani formanti incisa, ut corpus ejus sursum tolli nequeat, quin exterior illius apophysis extremitate sua citò innitatur ossi sibi subjecto, à quo hæc parum distat. Hinc fit, ut musculus monogastricus auris longiore tendine suo incudem versus superiora multum erigere nequeat.

Ex supra dictis clarè patet ut plurimum binas, & aliquando tres esse causas mechanicas propter quas musculus monogastricus longiore tendine suo incudem & malleoli paululum solummodò versus superiora tollit, adeoque internam apophysin ipsiusmet incudis, & finem extremum manubrii malleoli paululum tantummodò demittit.

Ubi



Ubi corpus incudis parum sursum erigitur, interna illius apophysis parum deorsum inclinatur, ut mox notatum fuit, & uno, eodemque tempore caput stapedis, cui lenticularis ossis interjectu annectitur, secum trahit, adeoque parum quoque illud demittit. Dum caput stapedis parum deorsum inclinatur, necessario superna pars baseos stapedis ejusdem à superna fenestræ labyrinthi parte, cui superjacet, nonnihil recedit, atque adeò illam paululum aperit & quodammodò pulsar, si ita loqui fas sit.

Ex his, quæ modò dixi, facile intelligitur tendinem longiorem monogastrici auris muscoli auditui facilius ac perfectius excitando bifariam conducere. Primum enim quatenus manubrii malleoli extremitate membranam externam tympani tendit, & superficiem illius planam, aut fermè planam reddit ea ratione, qua supra explicatum fuit, efficit ut pororum ejus parietes nonnihil à se invicem diducantur, ac propterea materia æthereæ, cum ad hanc membranam appellit, incussis sibi ab objectis sonoris impressionibus onusta, illos ita patentes reperit, ut eos tympani cavum ingressura facile permeet: Ubi verò tympani cavum ingressa est, levi suo pondere, licet sibi minimè incommodo (prædictis scilicet impressionibus) in ætheream sese exonerat materiam, quæ inibi conclusi aëris poros replet, quæque illas in labyrinthum per januam & fenestram illius transfert. Cum primum objectorum sonorum impressiones ad interiora labyrinthi pervenerunt; eæ ibi loci spiritui animali intra diversas nervi mollioris auris propagines recondito, æthereaque materiâ gravido incutiuntur; spiritus verò animalis merum ipsarum characterem ad ovale cerebri centrum transmittit, ubi hanc excitat in anima ideam, cui ex placito Dei Optimi Maximi excitandæ aptus natus est.

Secundò



Secundò longior musculus monogastrici auris tendo auditui facilius, ac perfectius producendo inservit, videlicet quatenus eâ, qua supra explicatum fuit, ratione supernam fenestrâ labyrinthi partem paululum aperit; quoniam dum hæc aguntur, pars una æthereæ materiæ incussas sibi ab objectis sonoris impressiones secum vehens secundum labyrinthi vestibulum facilius ingreditur, dum pars altera primum subit.

Iis, quæ contractionem tendinis longioris musculi monogastrici auris consequuntur, hætenus explicatis, operæ pretium est, ut ea nunc explicemus, quæ contractione tendinis brevioris musculi ejusdem fiunt, ut commoda dignoscantur, quæ homini exinde nascuntur. Dum musculus monogastricus auris contrahitur, is brevioris tendine caput malleoli unâ cum incudē versus seipsum parum obliquè trahit. Hinc fit, ut extremitas manubrii malleoli, & acumen internæ apophyseos incudis ex interioribus tympani versus exteriora necessariò inclinentur. Et verò dum finis extremus manubrii malleoli è cavo tympani versus meatum auditorium inclinatur, hic necessariò convexam partem, cui annexitur, exterioris membranæ tympani deprimit, adeoque naturali ejus tensioni augendæ, necnon utrique illius superficie planæ reddendæ plurimum conducit. Ubi pars acuminata internæ apophyseos incudis ex interioribus tympani versus exteriora inclinatur, ut supra dictum fuit, hæc necessariò caput stapedis ossis lenticularis interventu sibi annexum secum trahit, atque adeò partem lateralem internam baseos hujusce ossiculi à parte quoque laterali interna fenestræ labyrinthi nonnihil remouet, & tunc rimula interjicitur margini laterali ac interno baseos stapedis ipsius, & margini quoque laterali ac interno fenestræ labyrinthi, quæ materiæ æthereæ incussis sibi ab objectis sonoris impressionibus onerata ac velut obsignata, & labyrinthum ingres-



ingressuræ aditum, sed arctum sanè, in concham præbet.

Ex his, quæ jamjam dixi, clarè patet binos muscoli monogastrici auris tendines iisdem muniis obeundis dicatos esse; licet motus eorum, utpotè in diversas loci partes prorogari, diversimodè fiant, quin sibi tamen adversentur, ut ex supra dictis facilè intelligi potest. Ac re quidem ipsa eorum unusquisque ratione sibi propria exteriorem membranam tympani tendit, planamque reddere nititur; atque adeò materiæ æthereæ incussas sibi ab objectis sonoris impressiones secum vehenti aditum in cavitatem tympani expeditiorem reddit: dum longior supernam fenestræ labyrinthi partem parum aperit, brevior ejusdem fenestræ partem lateralem internam nonnihil recludit, quò rimulâ tunc ibi loci factâ æthereæ materiæ aliqualis portio concham subire queat.

Quod attinet ad actionem muscoli minoris auris internæ, hæc facillimè intelligi potest. Iste namque musculus, si originis & insertionis ejus ratio habeatur, in semetipsum contrahi non potest, quin stapedis caput, cui inseritur, ab exterioribus tympani versus interiora trahat, atque adeò partem lateralem externam fenestræ labyrinthi parum aperiat, ut materiæ æthereæ aditum in concham præbeat. Ex his clarissimè patet musculum minorem auris, de quo nunc, dum sese contrahit, & musculum monogastricum spectatum quâ tendine suo breviori agentem fenestram labyrinthi opposita prorsus ratione aperire. Hinc haud dubiè fit, ut propter oppositas motus naturales jamjam explicatos binorum ejusmodi musculorum labyrinthi fenestra nunquam multum aperiat, imò & aperiat tantum per latus suum externum musculo minore agente. Contra verò hæc ipsamet fenestra per superiora, & uno eodemque tempore per latus suum internum recluditur, ubi mus-



culus monogastricus sese contrahit, ut superius fusè atque nitide explanatum fuit.

Partes superius descriptas, quibus tympani cavum adornatur, muniis obeundis dicatas esse, quæ ab ipsis naturaliter præstari dixi, à nemine in dubium revocare potest; quandoquidem auditus toties læditur, quoties naturalis illarum status immutatur: neque tamen quempiam in hanc abire sententiam velim illas ad auditum excitandum absolutè necessarias esse; quia sæpe in sectione cadaverum humanorum observavi externam ut & internam tympani membranam, imò & aliquando majorem musculorum illius portionem desiderari; quoniam hæ partes acri pure abscessus modò in foveolis apophyseos mastoidis, & modò in cavo ipsiusmet tympani producti corruptæ, prorsusque consumptæ fuerant; & tamen in omnibus his hominibus, quorum auris una vel altera abscessu pus emittente laboraverat, auditio in aure affecta prorsus abolita non fuerat, ut ab illis, dum erant in vivis, didici.

Singularum partium in cavitate tympani latentium (si ossicula quatuor non nemini nota excipiatis) structura, figurâ, mutua connexione, necnon genuinis unicujusque ipsarum muniis curiositate penè religiosa indagatis & explicatis, unum explicatu maximè difficile mihi perpendendum superest; videlicet an bini auris internæ musculi voluntariè, vel absque prævio ullo voluntatis actu motus illorum determinandi capace moveantur. Re attentè, quantum fieri potuit, perpensa, in hanc sententiam non abire non potui ejusmodi musculorum motum, utpote partim à voluntate, partimve ab impressionibus objectorum sonorum, insciâ, imò & aliquando reluctante animâ, determinatum, partim quoque voluntarium & partim involuntarium esse. Ac re quidem ipsa verosimillimum est hoc ipso voluntatis actu, quo ad aliquid faciliè atque clarè audiendum determinamur,



terminamur, spiritum animale determinari ad fluendum versus musculos, de quibus mox dixi, ut motum illorum promoveat, cujus ope rei audiendæ perceptio expeditius & clariùs fiat. Verum enimverò musculorum auris internæ motus merè voluntarius dici nequit; cùm nemo sit, qui propriâ experienciâ persuasum non habeat illos præter voluntatem sæpe moveri, ut jam dixi. Quæ cùm ita sint, extrinseca tantum causa detigenda superest, quæ ipsos ad sese movendos excitat, & ratio explicanda qua hæcce causa suum producit effectum.

Quod ad causam extrinsecam attinet, quæ musculos auris internæ ad sese movendos determinat, nullam aliam excogitare licet quam materiam ætheream objectorum sonorum impressionibus onustam. Et verò hujusmodi causam ea, qua sequitur, ratione prædictos musculos ad motus suos obeundos excitare verisimillimum mihi videtur.

Dum materia ætherea repetitis vibrationibus suis, quæ sese modò citiùs modò tardiùs excipiunt, ad exteriorem membranam tympani appellit, tota ferè in concavam illius partem derivatur, & tum ad eam appellendo, tum ejus poros subeundo, & permeando illam percutit, & versus interiora capitis protrudit. Ubi autem concava pars exterioris membranæ tympani percutitur, & versus interiora capitis protruditur, annexam sibi extremitatem manubrii malleoli è meatu auditorio versus tympani. Cavum pellit, sursumque erigit, & uno eodemque tempore caput illius, eique alligatam incudem deorsum inclinat. Dum caput malleoli & incus deorsum inclinantur, binos tendines musculi monogastrici auris internæ ad se trahunt, totumque musculum extendunt, atque adeò illum ita disponunt, ut vim elasticam ipsius contractioni promovendæ aptam acquirat. Verùm cùm vibrationes aëris æthereâ materiâ imprægnati, utur citò



fiant & sese consequantur, exiguis quibusdam temporis intervallis semper ab invicem distinguantur, certo certius esse mihi videtur & temporis intervallo, quod inter primam, exempli gratia, & secundam vibrationem intercedit, prædictum musculus eâ, quam adeptus est, vi elastica, dum extensus fuit, lenique sua extensione determinari ad sese contrahendum, & spiritum animale avocandum, & reapse contrahi, juvante scilicet spiritu animali recens motricum fibrarum illius poros ingresso. Contractus autem musculus monogastricus stapedem ex interioribus tympani versus exteriora pellit, & sic musculus minorem auris internæ extendit. & ita disponit, ut vim elasticam ipsi contrahendo aptam adipiscatur, cujus ope determinatur ad sese contrahendum, & reverà contrahitur spiritu animali interveniente, statim atque musculus monogastricus rursus ea, qua mox explicatum fuit, ratione iterum extenditur.

Singulis partibus tympani cavum adornantibus descriptis, & mechanicis earum muniis accuratè, quantum fieri potuit, designatis & explicatis, partis alterius internæ auris, labyrinthi scilicet, exteriora & interiora lustranda veniunt, si prius dixerim os, ex quo interiores singularum ejus cavitatum parietes conflati sunt, album, durissimum, necnon maximè compactum esse. Id autem à natura ita comparatum esse videtur, ut materia ætherea sonorum objectorum impressionibus onusta, dum prædictis impingitur parietibus, nihil aut saltem fere nihil motus sui amittat, atque adeò illum qualem ab objectis sonoris accepit, talem aut saltem fere talem communicet spiritui animali contento intra expansiones rami mollioris nervorum auris, quæ variis atque variis modis configuratæ variè atque variè interiora labyrinthi adornant, ut ex dicendis in sequentibus patebit.



In exterioribus labyrinthi, quem omnipotens intra petrosum os excavavit, & nunquam satis mirando modo effinxit tria tantum notatu digna sese offerunt, osseum nempe sepimentum supernam ejus partem occupans, quo intermedio ductus tres semicirculares illius ab invicem dispescuntur; & aperturæ duæ non procul ab invicem distitæ, quæ materiæ ætheræ aditum præbent è tympani cavo in labyrinthum. Portio illa ossis petrosi, quæ ductibus tribus semicircularibus interjacet, ac proinde illos ad instar sepimenti ossei ab invicem dispescit, hoc peculiare habet, quod textum interius ejus quamplurimis foveolis pervium sit, intra quas permultæ capillares vasorum sanguiferorum propagines disseminantur. Et verò sanguis, quem ejusmodi vascula devehunt, miti calore suo naturalem fovet, atque conservat motum spiritus animalis in poris membranularum nervearum intra semicirculares labyrinthi ductus reconditarum hospitantis, atque adeò impedit nè supra modum condensetur, & auditui excitando ineptus evadat.

Binæ aperturæ supra designatæ in hac ossis petrosi parte sunt excavatæ quæ labyrinthi basim constituit: prima figuram habet ovalem, & situs ejus paulo altior est quàm situs secundæ: hæc labyrinthi fenestra nuncupanda mihi videtur; siquidem conchæ ac proinde labyrinthi interioribus inhiat. Hanc, de qua jam sermo habetur, aperturam interioribus labyrinthi inhiare non abs re dixi, cum hæc parieti conchæ incisa sit, quæ pars illius est, cujus interventu reliquas inter partes ejus interiores communicatio quædam habetur, ut infra dicitur. Huicce fenestræ stapedis basis applicatur, & illam claudit, quandiu auris internæ muscoli otiantur; contra verò eam paululum recludit, quoties eorundem musculorum alteruter in semetipsum contrahitur, ut supra explicatum fuit.

Alteram



Alteram binarum aperturarum, de quibus nunc agitur, ferè rotundam labyrinthi januam appello; quoniam hæc aditum præbet in parvam cavitatem fermè rotundam, qua itur ad labyrinthum. Etenim parva hæcce cavitas cum cochleæ extremitate ductus semi-ovalis spiralis illius, & cum concha rimulâ basi ejus incisâ, atque adeò cum ductibus semicircularibus in sequentibus describendis communicat, ut postmodum explicabitur. Quæ cum ita sint prædictam aperturam januæ labyrinthi nomine jure, meritoque à me insignitam esse nemo non videt. Janua ista membranulâ tenuissimâ velatur, & obturatur, quæ, utpotè rarissimam habens texturam æthereæ materiæ objectorum sonorum impressiones secum vehenti facilem in labyrinthum aditum præbet, ut superius dictum, explanatumque fuit.

Ex supra dictis intelligitur retro januam labyrinthi exiguam esse cavitatem, quæ primum illius vestibulum nominari posse mihi videtur; cum hæc eatur ad cochleam, & concham à clarissimo D. Duverney vestibulum labyrinthi nominatam. Ita ut tres semicirculares labyrinthi ductus, & cochlea sint veluti bini ejus andrones ab invicem conchâ distincti, & tamen ejus interjectu simul communicantes; proptereaque illam secundum labyrinthi vestibulum nuncupo.

Tenuissima hæc membrana, quam labyrinthi januam obturare superius dixi, in primum illius vestibulum exporrigitur, totamque superficiem ejus interiorem cooperit, proindeque extrinsecus claudit rimulam basi conchæ incisam, & cochleæ finem extremum; ita ut hæc adhærescat tenuissimis membranis nerveis conchæ, & cochleæ interiora occupantibus, earumque interventu cum ramo molliori nervorum auris communicet.

Ut ordo, quem hæctenus in aure interna describenda servavimus, & postmodum servaturi sumus, auditus explicationem facilem planamque reddere queat, explorato



plorato primo labyrinthi vestibulo, secundum explorabo. Vestibulum istud, quod idem ac concha veterum omnium anatomicorum sonat, multò magis amplum est quàm primum: cavitas ejus penè rotunda duarum circiter linearum diametrum habet; ita ut duo ferè tritici grana in tres vel quatuor portiunculas divisa in adultis continere possit, ut aliquoties expertus fui: in ea novem observantur aperturæ; bina nempe foramina exigua, penèque insensibilia, quæ in ipsam aditum præbent binis propaginibus exiguis rami mollioris nervorum auris inferiùs describendis; rimula sat longa nonnihil flexuata basi ejus incisa; ovalis apertura in pariete illius tympani cavum respiciente sculpta, & ab antiquis anatomicis fenestra ovalis nuncupata; & ostiola trium ductuum semicircularium, quæ quinque tantum sunt; quoniam ductus semicircularis superior, qua scilicet parte capitis posteriora respicit, inferiori cum ductu semicirculari ita coit, ut ambo sibi communi ostiolo unico conchæ interioribus inhient. Hinc fit, ut ostiolum istud unà cum recentioribus anatomicis portam communem nuncupem.

Singula ductuum trium semicircularium ostiola ita configurata sunt, ut ostium finem extremum tubæ occupans quadantenus referant. Ac re quidem ipsa semicircularium ejusmodi ductuum cavitatem, si attentè, quantum par est, exploretur, à media sui parte sensim ampliorem fieri ad binas usque suas extremitates oculis clarè patet, ac proinde illam ea fermè ratione utrinque finiri oportet, qua tubæ cavitas finitur: hæc, de quibus nunc sermo habetur, ostiola ita disposita sunt, ut duo summam, & duo imam conchæ partem occupent; quintum verò sat prope rimulam ipsiusmet conchæ basi incisam situm est.

In hoc secundi vestibuli labyrinthi latere, quod exteriora capitis respicit, exigui tres sunt canales rotundi, quos,



quos, utpotè in semicirculum inflexos, unà cum recentioribus anatomicis semicirculares appello. Et verò ut canales isti *ab invicem* distingui possint, illis distincta nomina ab eorum situ desumpta tribuam: *primum* superiorem nuncupabo, quòd arcuatum conchæ laquear *circumdet*: *secundum* inferiorem quòd imas ejusdem laquearis conchæ partes cingat: *tertium* verò, quippe qui inter primum & secundum situs est, medium nominabo.

Semicircularis ductus superior, cum primum è vestibulo prodiit, sursum tendit, sursumque tendendo paululum in semetipsum inflectitur; ubi verò paulo plusquam dimidium circulum descripsit, & ad medium usque posticæ ossis petrosi partis sese parum incurvando exporrectus fuit, inferiori committitur canali, ut mox dicetur.

Secundus semicircularis ductus, quem inferiorem nominavi, ex ima conchæ parte prodit, & decurso paulo majori quàm dimidii circuli spatio, ductui semicirculari superiori adjungitur, ut modò dixi; itaque bini ductus isti in unum planè coalescunt, qui obliquè protenditur, donec in ostiolum illud desinit cæteris ostiolis paulo amplius, quod porta communis nuncupatum fuit.

Tertius ductus semicircularis, quem medium vocavi, separata duo habet ostiola, nec plusquam semicirculum describit. Ductus isti, quorum superficies interior valde lævigata est, ut plurimum interiùs rotundi sunt, & aliquando figuram ovalem imitantur.

In hoc secundi vestibuli labyrinthi latere, quod tribus ductibus semicircularibus oppositum est, & capitis interiora respicit, alterum labyrinthi andronem cochleam dictum, collocavit natura. Cochleam in binas divido partes, quarum prima cochleæ nomen retinet, & cavitatem habet, quæ lentem crassiorem facillè admittere



mittere posset : altera verò pars ductus semi-ovalis spiralis dicitur. Hâc rami mollioris nervorum auris portione, quæ per cochleam disseminatur, exemptâ, osseum mediæ illius basi adnatum corpus observatur lineâ circiter unâ longum, in spiram dispositum, & quadantenus pyramidale, ac proinde nucleus pyramidalis cochleæ nuncupatum. Hicce cochleæ nucleus circa mediam sui partem lateralem capitis interiora respicientem tenui laminâ osseâ pellucidâ innititur, quæ marginem ostii ductus semi-ovalis spiralis partim constituit, inò & latus internum secundi gyri laminæ spiralis prædicto nucleo pyramidalis circumductæ partim format ; ita ut secundus ille gyrus laminæ spiralis, de qua jam dixi, partim osseus, partimve nerveus sit.

Intra medium nuclei pyramidalis textum unum excavatum est foramen valde sensibile. Non procul ab acumine nuclei pyramidalis jamjam descripti tenuissima in adultis observatur prominentia ossea in orbem disposita, & quarta circiter lineæ unius parte lata, quæ superficiei internæ cavitatis cochleæ adnata est, proindeque illam apophysin orbicularem cochleæ appello. In medio osse cochleæ extremitatem formante una excavata est foveola. Cæterum tota superficies interior cochleæ valde lævigata est, & si microscopii interpositu inspiciatur, quamplurimis foraminibus exiguis per via apparet, potissimum in ea parte, quæ nuclei pyramidalis basi circumjacet.

Secunda cochleæ pars est ductus semi-ovalis spiralis, ut supra notatum, qui à basi cochleæ, ubi suum habet initium, ad supernam primi vestibuli labyrinthi partem, & rimulam usque basi secundi incisam protenditur : cavitas ejus ita conformatur, ut in semi-ovalem spiram disponatur, & circa finem paulo latior sit, quàm circa initium : hac rami mollioris nervorum auris portione semota quæ per eam disseminatur, in illa processus osseus

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tenuissi-



tenuissimus observatur, qui à latere interno baseos nuclei pyramidalis cochleæ ad extremitatem usque illius porrigitur. Hunc processum osseum, utpotè minimum, lineam osseam ductus semi-ovalis spiralis cochleæ nominare lubet. De cætero tota superficies interior ejusmodi ductus exiguiissimis pluribus foraminibus pervia valde lævigata est, si hanc partem illius exceperitis, in qua linea ossea, de qua supra, prominet.

Totius auris internæ labyrinthi interioribus exploratis, & accuratè, quantum fieri potuit, descriptis, reliquum est ut varias rami mollioris nervorum ipsiusmet auris propagines, quæ per ea disseminantur, exactissimè describam. Ramus mollior nervorum septimæ conjugationis ramo duriore crassior, licet multò pauciores quàm i le fibras medullares à processu *annulari* recipiat, *internum* auris *ductum* ingressus in tres dividitur ramulos; *superiorem* nempe, *infimum*, & *medium*: superior conchæ cavitatem subit per foramen peculiare supernæ illius parti incisum; ibique in membranam tenuissimam rarissimam necnon mollissimam explicatur, quæ totam ejus superficiem cooperit, si fibrillam illius excipiat retinentem formam nervuli, qui innititur & adhæret exiguæ apophysi osseæ nonnihil acuminatæ marginem internum supra notati foraminis occupanti, & ob superficiem suam parum inæqualem, nerveaque membranâ albicante jamjam descriptâ coopertam exiguum apicem album quadantenus æmulanti. Nervulus ille mollissimus tenerrimusque arteriolam & venulam comites habens, quæ latera illius occupant & immediatè tangunt, ubi secedit ex apophysi ossea, cui eum innixum & adhærentem esse modò dixi, mediam conchæ cavitatem instar funiculi tensi decurrit, & ad latus usque portæ ductui semicirculari superiori & ductui semicirculari inferiori communis porrigitur, eique adhærescit, ac deinceps portam communem subit, eamque subeundo



subeundo in binas expanditur membranulas, quarum una superficiei interiori cavitatis ductus semicircularis superioris, & altera interiori quoque superficiei cavitatis ductus semicircularis inferioris supersternitur. Infimus ac minimus rami mollioris nervorum septimi paris ramulus unâ aut alterâ penè insensibili fibrillâ emissâ, quæ disseminatur intra textum interius hujus ossis petrosi partis intra quam semicirculares labyrinthi ductus excavati sunt, perexiguum foramen subit, cujus interventu in infimam conchæ partem sese insinuat, & ibi explicatum tenui huic membranæ formandæ impenditur, quam interiori conchæ ipsius superficiei superstratam esse supra dixi, si portiunculam illius exceperitis, quæ ductum semicircularem medium ingreditur per foramen situm paulo subtus portam communem, de qua superius, ibique in membranulam tenuissimam expanditur, quæ interiori ductus illius superficiei supersternitur.

Nervæ membranulæ tenuissimæ interiora ductuum semicircularium labyrinthi occupantes irrigantur vasis sanguiferis exiguiis, & ut plurimum oculorum aciem fugientibus, dum scilicet nullum, vel paucissimum tantum sanguinem intra perexiguas cavitates suas continent. Ipsæmet membranulæ, utpotè limpidissimo ac subtilissimo liquore spirituofo imbutæ, præsertim in recens natis, adeò molles sunt, ut vix tangi possint, quin dilacerentur, ut ut leviter instrumento quovis tangerentur. Præterea illæ, si radiis solaribus excalesfacto aëri exponantur, citissimè exsiccantur, & ita friabiles evadunt, ut, si è sede sua dimoveantur, in frustula minima dividantur, terantur, & redigantur in pulverem subtilissimum, qui facillimè tenues evanescit in auras. Limpidissimus pariter liquor spirituosus, quo membranulas, de quibus nunc, semper imbutas esse dixi, & qui nihil aliud esse videtur quàm spiritus animalis ob nativam loci quem occupat frigiditatem nonnihil condensatus, ferè momento citius dissipatur, postquam ductus se-



micirculares labyrinthi aperti fuerunt, quos in recens natis ejusmodi liquore semper repletos observavi. Hoc autem aliter sese haberet necessario, si quinque ostiola, quibus semicirculares labyrinthi ductus interioribus conchæ inhiant, membranâ nerveâ superius descriptâ naturaliter obturata non essent. Nequaquam tamen dubitandum mihi videtur, quin liquor, de quo modò locutus sum membranæ nerveæ conchæ poros sensim sine sensu subeat, & impediatur ne supra modum exsiccet, hinc fit, ut nativam illius temperiem conservet; qua scilicet auditui excitando conducit.

Ex supra dictis patet incisam conchæ basi rimulam, & ovalem illius fenestram, ut & quinque ostiola ductuum trium semicircularium labyrinthi nerveâ, tenuissimâque membranâ obturari, quæ conchæ interiora occupat, ut supra dixi.

Medius rami mollioris nervorum septimi paris ramulus juxta hanc ossis petrosi partem, quæ basis est nuclei pyramidalis cochleæ, plures emittit fibrillas, quæ cum primò cochleam ingressæ sunt arteriis & venulis committatæ suam inibi formam mutant, & sequenti ratione disponuntur, atque distribuuntur: Imprimis tenuis illarum membrana, quam piæ meningi acceptam referunt, ita explicatur ut desinat in membranulam tenuissimam, & numerosissimis vasculis sanguiferis irrigatam, quæ primò cooperit superficiem basalem nuclei pyramidalis cochleæ, & quicquid ab illa usque ad secundum gyrum laminæ spiralis ipsiusmet nuclei pyramidalis continetur, ac deinceps in Ductum semi-ovalem spiralem ejusdem cochleæ porrigitur, & ita expanditur, ut finem illius extremum obturet, & totam ejus superficiem, imò & utrumque latus laminæ spiralis semi-ovalis inibi reconditæ obducatur. Et verò hæc membrana, cum tenuissimæ, rarissimæque texturæ sit, non impedit quoniam materia ætherea continuò & expeditè è tympano in labyrinthum, singulosque illius recessus transeat, licet ductus  
semi-



femi-ovalis spiralis cochleæ finem extremum obturet, ut supra notatum. Hinc fit ut sita retro labyrinthi januam cavitatem ad labyrinthum ipsum iri supra dixerim.

Quod attinet ad substantiam medullarem fibrillarum nervearum, de quibus nunc sermo habetur, hujus portio una impenditur formando secundo gyro laminæ spiralis nucleo pyramidalis cochleæ circumductæ, cujus scilicet gyri latus internum merè osseum est, ut superius insinuavi: altera verò portio initium ejusdem laminæ spiralis primùm format, quod in dimidio tantum gyro merè nerveo consistit, ac deinceps in ductum semi-ovalem spiralem cochleæ porrecta desinit in laminam spiralem semi-ovalem verè nerveam, quæ inibi reconditur, quæque crassiore sui parte lineæ ossæ hujusce ductus adhærescit. Ita ut initium laminæ spiralis nuclei pyramidalis cochleæ sit etiam initium laminæ spiralis semi-ovalis, quam modo descripsi. Ejusmodi autem lamina spiralis semi-ovalis ad extremum usque finem ductus, intra quem latitat, exporrecta nonnihil acuminata extremitate sua mediæ parti rimulæ basi conchæ incisæ adhærescit, adeoque ejusmodi ductum in partes binas dispescit, inter quas nulla est sensibilis communicatio: binæ istæ partes ductus semi-ovalis spiralis cochleæ ita dispositæ sunt, ut prima, quæ capitis interiora respicit, cum primo & secundo vestibulo labyrinthi communicationem habeat; secunda verò tympanum, proindeque capitis exteriora respiciens cum concha tantum communicat.

Medius rami mollioris nervorum septimi paris ramulus, fibrillis tenuissimis modò descriptis emissis, foramen exiguum intra medium textum nuclei pyramidalis cochleæ incisum subit arteriolam, venulamque comites habens, & cum primùm ex illo egressus est, tenuissima ejus membrana ita explicatur, ut cooperiat quicquid à secundo gyro laminæ spiralis nuclei pyramidalis cochleæ partim osseo & partim nerveo, ut supra dictum, usque  
ad



ad extremitatem ejusdem cochleæ continetur ; medullaris verò illius substantia desinit in tertium gyrum totum nerveum laminæ spiralis, de qua mox dixi, qui circumferentiâ suâ innititur, & adhæret apophysi orbiculari cochleæ ; demumque pars illius extrema in membranulam expanditur, quæ undequaque paululum in semetipsam inflexa margini foveolæ in media extremitate cochleæ excavatæ applicatur, & adhærescit, atque adeò parvam format cavitatem exiguum poculum clausum imitantem, cui innatus tantum aër inest,

Ex jam dictis patet laminam spiralem intra cochleam reconditam dimidio uno gyro, & gyris duobus integris solummodò constare, qui exiguis cavitatibus innato aëre repletis, inter quas nulla est sensibilis communicatio, ab invicem distinguuntur. Hic notandum venit quod lamina spiralis nucleo pyramidalis cochleæ circumducta, & lamina spiralis semi-ovalis intra ductum semi-ovalem spiralem ejusdem cochleæ recondita, ut & membranulæ nerveæ interiori superficiei ductuum trium semicircularium superstratæ succo limpidissimo spirituosissimo, præsertim in recens natis, imbutæ sunt, qui apertâ cochleâ visu deprehenditur, & citissimè dissipatur. Interior verò, seu medullaris ac verè nervea substantia prædictarum laminarum brevi exsiccat, & valde friabilis evadit, si calido aëri aliquandiu exponatur, ut supra notatum.

Ex iis, quæ modò dixi de ramo molliore nervorum septimæ conjugationis, facile intelligi posse mihi videtur binas superiùs descriptas laminas spirales nerveas unâ cum tenuissimis nerveis conchæ, & ductuum trium semicircularium interiora occupantibus immediatum atque completum auditus organum constituere ; adeò ut pro diversis motibus, qui in eo, quem proprios intra poros recondunt, spiritu animali ab objectis prædicti sensus excitantur, & communi sensorio communicantur, diversæ in anima soni idæ producantur.

Asseruit mihi, Viri Clarissimi, D. Baro de la Mousson vir nobilis istius urbis se Londini mense Julio anni proximè



proximè elapsi didicisse à clarissimis viris D. D. Briggs & Silvestre medicis celeberrimis vos pro ea, qua nati estis tum humanitate tum honestate summa me Regiam in societatem vestram cooptasse. Si eò fælicitatis pervenerim, ut me socium habere non dedigmeni, de cooptatione mea inexpectata amplissimas vobis gratias habeo; de mea, inquam, cooptatione vobis iterum gratias habeo, quæ, utpotè mihi perhonorifica, mihi quoque perjucunda non esse non potest. Cum enim honor omnis jucundus semper accidit, tum verò ille jucundissimus, qui à talibus, tantisque Viris profectus est, quales vos, ego, quantosque esse intelligo. Ad vos, nobilissimi viri, binas de sanguine dissertationes intra paucos dies mittam, quæ omnes haud dubiè perfectionis gradus, qui in iis desiderantur, acquirent, uti spero, apud vos, quibus nihil eorum, quæ nosse mortalibus datum fuit, non notum est: imò & identidem lucubrationum mearum fructus aliquos typis excudendos, & publicis scriptis vestris adjungendos vobis communicabo, si vobis id gratum fore mihi videbitur. Interim meas circa organum auditus animadversiones à clarissimo viro D. Herbert nobili anglo vobis meo nomine offerendas accipite: si minùs placent, pro meis non habebo, si secus, nec docti cujusquam judicium, nec publicam lucem reformidabunt, cujus usuram vos ipsi concedatis, quæso, iis, si vobis Dignæ videantur, quæ publici juris fiant. Valete, viri spectatissimi, & me vobis devinctissimum in ære vestro numerate.

Raymund. Vieussens, D.M.M.

Monspeli die vigesima  
mensis Februarii  
anni 1699.



III. *A Letter from Dr. William Musgrave to Dr. Sloane, being an Argument for the more frequent use of Laryngotomy, urg'd from a remarkable Cure in Chirurgery; perform'd by Mr. John Keen of Roch in Cornwal.*

SIR,

IT cannot pass your Observation, that the erroneous Opinions, and unhappy Prejudices; entertained by Mankind, in matters of Physic; have occasioned great Calamities, and been of Pernicious Consequence to them.

It was no small number of Men, that some years since, lost their Lives, from an Aversion to the Jesuits-Bark: depriving themselves of the Use and Advantage of that excellent Drug, from a Reason merely nominal.

The like unaccountable Humour obtained a long time against the use of Opiates, and a Temperate Regimen in the Small Pox; by which single Method, the famous Dr. Sydenham has in all probability already preserv'd more of his Countrymen, than in the last ten years fell by the Sword, in *Ireland* and *Flanders*.

Of such destructive Consequence are Errors of this kind, when they become Fashionable and Establish'd; and of such Public Advantage is it to hinder their Growth, and taking Root in the minds of Men.

We are still Labouring under many Prejudices of this Nature; some quite excluding, others rarely admitting, even in the utmost extremity, most advantageous Methods of Physic. I will at present mention only one; that is *Laryngotomy*, and set forth the ground-  
less



less Exceptions, and needless Fears, commonly express against this safe and useful Operation.

*Laryngotomy* is highly to be valued, for that in the greatest extremity, when a Man is in most imminent danger of Suffocation, and to all appearance within very few minutes of his last, by opening a new Passage for Breath; it gives speedy and certain Relief, and this when all other Methods fail: and without any considerable Injury from the Instrument. The Patient, in a Minute or two, is brought from the struggles of Death; to a state of Complacency, Ease and Security. In the large Field of Practical Physic; perhaps there is not any one Method that works so great a Change, for the better, in so short a time.

But however Beneficial this Operation is, in itself, we find it seldom practis'd; very seldom in Comparison to the occasions for it. That Gap which appears on the cutting a Throat, (the divided Parts being then drawn to their other more fixt ends;) together with the great Flux of Blood, when the Jugulars; and Carotid Arteries are also wounded; create in most Men a dread of this butcherly Operation; and make those, especially who are unacquainted with Anatomy, suspect all Wounds of the *Trachea*, as mortal; and oppose *Laryngotomy* under all the most urgent Circumstances.

This Prejudice is still of worse Consequence, for that Squinzies may be, as they often have been, Epidemical; (instances of which we have in *Panarol*, *Wier*, *Hippocrates*, &c.) in which Case this Operation becomes of more frequent necessity; and greater numbers of Men must perish for not admitting it:



In order to wipe off this Prejudice, (as far as Argument will go in this Matter ;) it may be affirm'd, that *Laryngotomy* is in great danger of Suffocation, allowable, and the Wound curable: for that, (to argue *à fortiori*) when the *Trachea* has been Cut through, the Parts have been joyn'd together, and the Wound cured.

Indeed, the *Encyclopædia Chirurgica* (Lib. 2. cap. 4.) has these words, *Quæ (vulnera scil. Asperæ Arteriæ) ut plurimum periculo sunt plenissima; præsertim si vasa Jugularia simul sint discissa, aut ipsa Arteria integrè per transversum dissecta; quæ nullâ Arte denuò connectetur, sed Machinæ humanæ totalem affert destructionem.*

But, in opposition to this Voluminous Authority, I beg leave to present you, with the following Observation, sent me by an Ingenious Chirurgeon, Mr. *John Keen* of *Cornwal*, who perform'd the Cure. You have it under his own Hand.

*Nicholas Hobb*, of *St. Enodor* in *Cornwal*, aged Sixty three or thereabout, was some time in *March* 1696. at a distance from any House set on by *Ruffians*, who first by a Blow on the *Occiput* knockt him to the Ground; then transected the *Trachea* somewhat beneath the *Pomum Adami*, together with several of the adjacent Muscles, and some large Blood-Vessels; from which he lost a very great quantity of Blood, seen afterwards lying on the Ground. The *Ruffians* having Robb'd him, and thinking him either dead, or past all recovery, left him. After some time the Wounded Man recovers so much Sense and Strength as to thrust his Neckcloth into the large and gaping Wound, and by degrees to crawl Home to his own House, not far from the Scene of this Tragedy. In



In this lamentable condition I was sent for, and after examination of the Wound, and considering the great Flux of Blood, I was not more surpris'd at any thing than that the Patient was then alive. There seem'd to be no manner of hopes, nor the least prospect of Recovery: however, in order to an attempt, I endeavour'd to suppress the Hemorrhage, and to join the divided parts.

*Lipothymies* came frequently upon the Patient, especially upon every little motion of his Body, and gave great interruptions to the Methods of Chirurgery, and lessen'd our hopes of a Cure. His frequent *Lipothymies* were after some time succeeded by Convulsions, and then indeed I thought his Thread of Life very near an end.

Another great difficulty arose from the parts of the *Trachea* being now at a vast distance from each other. The lower part being every turn of Inspiration sunk deep into the Neck as low as the *Clavicula*, and just appeared upon every Expiration.

To surmount these Difficulties, and particularly to secure the hold of the lower part of the *Trachea*, I order'd a sturdy strong Fellow, then present, to hold the Legs of the Patient over his Shoulders, and by this means raise them, together with the *Abdomen*, above the *Thorax*, *Collum*, &c. in which Posture the divided parts came so near to each other, that with strong waxen Thread I sew'd together several of them: but as to the Divisions of the *Trachea*, I secured them together by passing large Needles deep into the Flesh on each side, and twisting strong waxen Thread about them as in *labio fissio*. Over all, for greater security, I applied a Restrictive (*expulv. restring. Clowes*) covering the greatest part of the Neck with a Defensative,



*Ex bolo cum albumine ovor.* advising the Patient to lie as quiet as he could.

The Patient now begins again to Speak, and as well as the Cough, difficulty of Breath, and his weakness would allow, softly, and with a low Voice gives an account of the occasion as above.

An *Arteriac* was then made up for him (to smoothe the *Trachea*, and promote Expectoration) *è Troch. Pectoral. Batean. (in aq. Stephan ʒi. Solut.) ʒiij. Syr. Tussilag. ʒi. Balsamic, ʒi. pulv. Anis. Glycyrr. ana ʒi. Balsam. Sulphur. terebinth. ʒi. Peruv. gut. vj. cum mellis opt. despumat. q. s. fiat Linctus per Bacillum Glycyrr. sæpius ad libend.* From the use of which his Cough abated, and he discharged by Expectoration much Grumous Blood and other Matter.

As to the Convulsions and *Lipothymies*, I applied to his Nostrils *Spir. C. C. Succin. &c.* and Embrocated the back part of his Neck with a Liniment, *ex ol. Lil. Alb. ʒi. Tereb. Succin. ana ʒi. N. M. ʒi. Ung. Nervin. ʒvj. Mis.* And then took leave, and upon my return the next day found the Convulsions had left him; nor had he from that time any return of them, or of the Syncope.

But on the fourth day the Stitches were torn open, the Wound appear'd large enough to admit a middle siz'd Hand: a great part of the *Oesophagus* appear'd in view much inflam'd and scratcht by the Instrument. The *Epyglottis* did not as usual, cover the *Rima* of the *Larynx*, so that I could easily see up into the Mouth, part of the Annular Cartilage was cut obliquely, and hung only by a little Fibre to the upper part of the *Larynx*, &c.

Indeed I met with frequent Ruptures, the wax Thread and Needles often fretting through the Flesh they



they held, and was by them put back in my Cure; but I as often repeated the said Stitches in manner and method as before-mentioned.

About the tenth Day the larger Blood-Vessels appear'd conglutinated and covered with new Flesh; the *Gula* of good Aspect, the Inflammation of that and all the Neighbouring parts gone. I now dress'd with Lini-ment *Arcei*.

On the Eleventh the symptomatic Fever was in a manner gone, and the Wound under the circumstances of good digestion.

In the mean time the Diet when he could swallow was of Mutton-Broth, Ale-Meat, Poacht-Eggs.

The Cough continuing a long time very severe, was at length overcome by duly adhereing to the *Linctus* aforesaid, with repeated Boles of *Balsam. Lucatel. Conf. Rosar. Rub. horâ somni*, with a Draught of a Pectoral Decoction, used also instead of common Drink. To mitigate the violence of it, and procure him Sleep, the following *Haustus* was frequently used, and never fail'd our expectation. *Rx Ol. Amygdal. Dul. Rec. Express. 3℥. Syr. de Mecon: 3vj Laud. Lond. (Aq. Steph. 3ij. Solut.) gr. ij. fiat haustus horâ somni sumendus.*

About the Eleventh and Twelfth Days we plainly discovered little Portions of new Flesh arising not only from the Carneous Membrane incumbent on the Gullet, but also out of the Substance of the Cartilages themselves, both on the upper and lower parts of the divided *Trachea*. The external containing parts of the Neck began now to unite by Incarnation; new Flesh arising and apparently lessening the dimensions of the Wound every time there was a Laceration of the Stitches, insomuch that two Needles were now sufficient, whereas I used in the beginning not less than six.



fix. And those Carneous Portions both of the *Trachea* and Exterior parts, gradually joining and intermixing, became one solid *Cicatrix* from each end of the Wound almost to the middle of the Wind-Pipe, where the Air continued in some degree to have an Exit.

About the Fifteenth Day I removed several pieces of Bones which had contracted a Caries in the Cartilage (which in this old Man as in many others was grown Osseous) and were thrust out by the New Flesh.

He now Swallows with little trouble, Eats sufficiently, and nourishes in Proportion. The Aperture about the Twenty sixth Day was almost clos'd up, and in Four or Five Days more the sides of the Wound were perfectly join'd and Cicatriz'd, the *Trachea* performing its part in Respiration as at other times without any considerable inconvenience.

He speaks indifferent well, but is forc't to take care in swallowing, the *Rimula* not being exactly shut as before the Wound, which makes Liquor of any sort more apt to fall into the Canal, and so cause a Cough, Hoarseness, &c. He does not Swallow dry Meats as well as formerly, but in all other respects is as well as ever.

This Cure was in this manner perform'd by me *John Keen*, of *Roch in Cornwall*, in the Year 1696. as above.

This signal History affords Matter for much Observation; but the only use I shall at present make of it, is, that if, in a Person of this Age, (above Sixty;) if in a Wound whereby the *Trachea* was Cut through, and several of the Cartilages beaten together; the divided parts of the *Trachea* may be made to unite and grow



grow together, (as in the present Case ;) certainly then *Laryngotomy*; which is a much less dangerous Wound indeed, but little in Comparison to it: in violent Squinzies, in danger of Suffocation, from Causes of a like nature with them; may safely, and ought to be put in Practise. The Disadvantage is a slight Wound easily cured; the Advantage nothing less than the Life of a Man.

*Exon. Dec. 28.*  
1699.

*F I N I S.*



## An A D V E R T I S E M E N T.

Viris Eruditis Saciæ Antiquitatis Studioſis Joannes Anifſonius. Præfectus Typographeo Regis Chriſtianiffimi.

**C**OEPTA ſunt nuper à nobis Aëta Conciliorum, cum Epiſtolis Decretalibus & Conſtitutionibus Summorum Pontificum Regiis typis imprimi. Damus autem operam, ut & elegantia charaëterum & chartæ nitore, priores reliquas editiones hæc editio longe antecellat.

Prodire enimvero voluit adeo utile Reipublicæ Chriſtiane opus è ſuo Typographeo Chriſtianiffimus Rex LUDOVICUS MAGNUS: juffitque nulli in eam rem operæ vel ſumptui parci. Optat ille nimirum, ut & legentium oculos illiciat detineatque cum voluptate perfectio artis in eo opere: & poſſiſſima ſumptuum parte in ſe ultro ſuſcepta, ſentiant in hoc quoque genere Regiam munificentiam, tum viri Principes, quos hiſce voluminibus muneraturus eſt: tum privatus quiſque, non modo è ſubjectis ſibi, verum etiam ex univerſo orbe Chriſtiano facta ſcilicet omnibus copia comparandæ hujus editionis Regiæ multo minori pretio, quam quæ privati cujuſquam Typographi, aut collatitiis ſocietatis ullius Typographica impenſis prodire poſſit in lucem.

Contulere certe annos jam complures in emendationem Græci Latinique contextus, collectionemque diverſorum monumentorum & variarum lectionum ex quamplurimis optimiſque Mſſ. ad hanc editionem omnibus numeris abſolvendam, viri pereruditi: quibus ſi quis aliquid nihilominus indicandum putaverit, quod huic operi locupletando & perficiendo proſit, ſcriptis ad nos literis ut id efficiat flagitamus; præſtituri viciffim, ut ejusdem fiat, collatique ab eo beneficii mentio perhonorifica in præfatione operi præfigenda. Pariſiis, v. Kal. Maias, anni MDCLXXXIX.

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